STATUS OF THE ELECTRICITY SECTOR

The SIGIR Electricity sector review examines projects intended to rebuild Iraq's infrastructure for the generation, transmission, and distribution of electricity. U.S. efforts to reconstruct the sector have focused largely on reconstructing and rehabilitating generation, transmission, and distribution networks, as well as system control and communications.

Figure 2-2 shows the locations of completed and ongoing projects in this sector.

IRRF-funded Activities in the Electricity Sector

Although 253 projects have been completed in this sector, 207 (34%) have yet to begin. There are several reasons for this apparent lag. First, the substantial funding re-allocations in this sector caused project delays and cancellations. Second, in design-build projects, the initial design and procurement work that precedes construction can take significant time. Third, many of these cancellations demonstrated that officials and contractors decided during the design process that a project may be too risky or costly to complete effectively.

The completion of projects in the Electricity sector (41%) lags behind other sectors. Last quarter, 15 projects were completed and 47 were started. GRD-PCO expects all of its projects, 425 out of 616 total sector projects, to be completed by January 2008.[2] Figure 2-3 shows the status of projects in the Electricity sector.

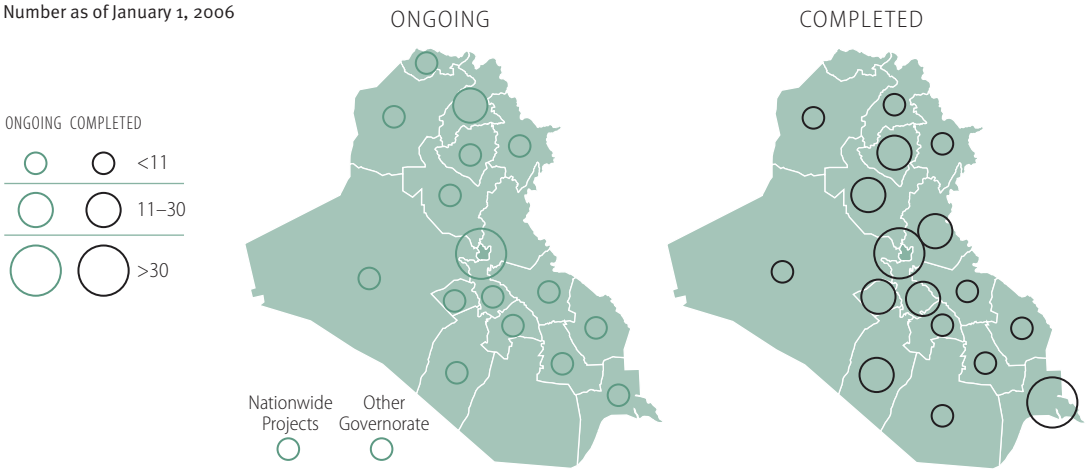
Almost $2 billion of the funds designated for electricity reconstruction–42% of the cumulative allocated total–have been expended. Last quarter, $144 million were expended in the sector. Figure 2-4 shows the status of funds in the Electricity sector.

In 2003 and 2004, U.S. reconstruction efforts in the Electricity sector began with USACE Task Force-Restore Iraqi Electricity (RIE), which managed $1 billion in mostly Development Fund for Iraq (DFI) monies.

Figure 2-2

ELECTRICITY PROJECTS BY GOVERNORATE

Number as of January 1, 2006



STATUS OF ELECTRICITY SECTOR

AS OF DECEMBER 31, 2005

Figure 2-5

ELECTRICITY SECTOR AS A SHARE OF IRRF FUNDS

% of $18.439 Billion

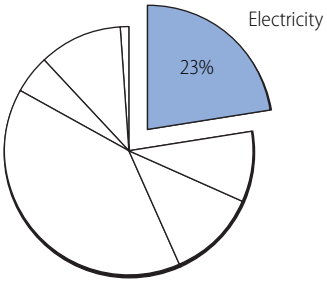


Figure 2-3

STATUS OF ELECTRICITY PROJECTS

Number of Projects

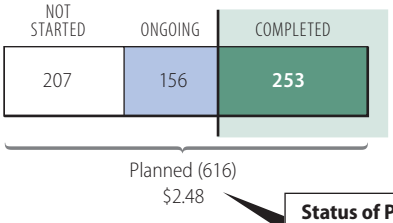
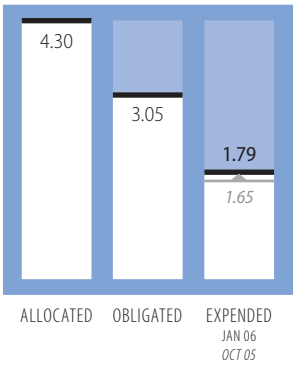
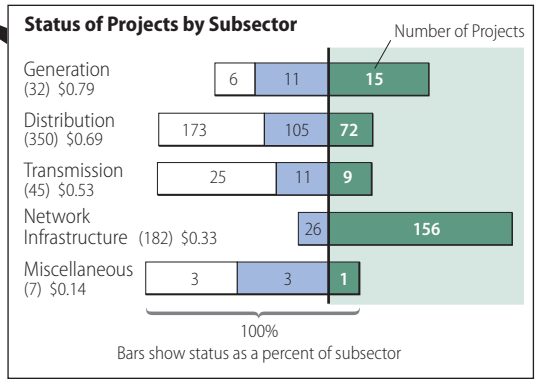


Figure 2-4

STATUS OF ELECTRICITY FUNDS

$ Billions





Initial projects focused on immediate needs. Construction and rehabilitation projects in the sector were later transferred to PCO, and USACE-GRD retained the construction management of projects. Thus, many projects in the sector were started under RIE contracts, while other projects were added later using IRRF dollars.

In 2004, according to PCO, the contracting approach began to shift from large, design-build, indefinite delivery-indefinite quantity (IDIQ) contracts to direct contracting methods, in an attempt to speed work and lower its costs. SIGIR currently has an audit underway to examine the efficiencies of design-build compared to direct contracting.

MAJOR PROJECTS COMPLETED AND ONGOING

The U.S. program has three major types of Electricity sector projects:

- *Generation facilities* produce the total megawatt capacity of power for the system.

- *Transmission networks* then carry that power throughout the country.
- *Distribution networks* deliver the transmitted power to local areas and homes.

Most U.S. projects focus on the distribution system while a limited number are large-scale generation projects that feed that system.

Generation

Two of the largest power generation reconstruction projects will significantly affect the Baghdad area when completed. The *Al-Doura* power plant, estimated to be completed in February 2006, is expected to add 280 megawatts (MW) to the electric grid, which will serve more than 1.5 million people.[3] Like many other power facilities in Iraq, *Al-Doura* was in great need of repair at the cessation of hostilities. U.S. officials chose to refurbish it rather than build a new plant. The second facility, the *Baghdad South* power plant, received two new power generators, adding 216 MW of power to the grid last quarter and serving the equivalent of 122,000 homes.[4]

Additionally, the installation of two gas turbine units at the *Khor Al Zubayr* power plant will supply 250 MW of power for 1.5 million residents in Basrah and can be distributed to the rest of Iraq as well.[5] According to GRD-PCO, this project was completed in early January 2006.

Transmission

Two important initiatives for improving transmission capabilities are ongoing in this sector. The Project Partnership Agreement (PPA), signed on November 30, 2005, is intended to execute specific projects in partnership with the Iraqi Ministry of Electricity, which in turn awards contracts for these projects to Iraqi firms.[6] According to GRD-PCO, the Ministry is reimbursed based on verification of work completed or milestones met by the contractor. The PPA is also expected to reduce overall costs, promote capacity development for the Ministry and contractors, and direct more work toward Iraqi firms.

Since 2004, the Direct Contracting Initiative (DCI) has shifted the emphasis from design-build contracting to a more standard firm fixed-price approach. This shift is designed to transfer risk from the U.S. agencies to the contractor and to position the U.S. government to limit cost increases and schedule delays. The downside, however, is that it takes the U.S. government longer to award contracts because of staffing constraints.[7]

Distribution

Similar to the DCI, the Rapid Contracting Initiative (RCI) was initiated in late 2004 to focus on the direct contracting of small distribution projects by using fixed-price contracts that are fully competitive. This potentially can make

Current Status of Electricity Reconstruction vs. Goals

(Megawatts)

End-state Metric	Pre-war Level	Stated Goal by CPA (2003)	End-state after Deferral[14]	Current Status as of 11/30/05
Generation Capacity	4,500	4,400 by late 2003, 6,000 long-term	5,500	3,995 (U.S. Contribution 2,710)
Transmission Capacity	4,500	6,000*	5,500	5,500

*There does not seem to be a record of a transmission capacity goal, but the current goal is to match the generation capacity of 6,000 MW.
Sources:
Pre-war levels: United Nations/World Bank Joint Iraq Needs Assessment, 2003
Goals: Coalition Provisional Authority FY 2004 Supplemental Request to Rehabilitate and Reconstruct Iraq, September 2003; Letter from L. Paul Bremer to White House, March 24, 2004
Current Status and End-state: Department of State Briefing by U.S. Embassy Baghdad, November 30, 2005.

Table 2-1

the contracting process better, faster, and less expensive than more traditional contracting strategies. Most of the projects not yet started in the Electricity sector will be executed as RCI projects to local Iraqi firms.[8]

O&M/Sustainability

GRD-PCO has begun a host of projects aimed at addressing the operations and maintenance (O&M) and sustainability concerns in the Electricity sector. GRD-PCO has allotted just more than $120 million to the O&M Program and proposed $340 million in funding to the Sustainability Program, including:

- efforts to train workers and officials to maintain U.S. assets
- critical parts and inventory support
- long-term O&M support services

Even though these initiatives present a significant start toward addressing an important concern, a SIGIR audit estimates that total costs for sustainment and O&M in the Electricity sector for 2006-2007 will be approximately $720 million.[9]

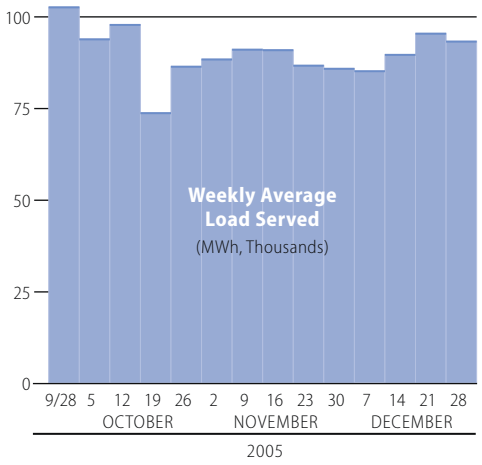
Monitoring and Control

The Supervisory Control and Data Acquisition (SCADA) system, signed on October 5, 2005, is designed to enable real-time control of the transmission system and to improve monitoring and the overall stability of the electricity system. SCADA can automatically isolate disruptions to a line or station, which should protect the rest of the grid and reduce the risk of larger, nationwide blackouts.[10]

SECTOR FUNDING CUT

Initially, the Electricity sector was funded by $5.56 billion,[11] from a total reconstruction appropriation of $18.4 billion. A series of reallocations that resulted in a 22% cut of sector funding, to $4.31 billion. Figure 2-5 shows the percentage of IRRF funds committed to the Electricity sector.

Figure 2-6
ELECTRICITY LOAD SERVED
MWh = Megawatt Hour



Outputs of IRRF-funded Projects

The primary output metrics for the Electricity sector are generation and transmission capacity, both measured in megawatts.[12] Both areas have fallen short of the original reconstruction goals set by the CPA. Before U.S. operations in Iraq in 1991, Iraq's electricity capacity (9,295 MW) was more than enough to meet the nation's demand (5,100 MW). But the Persian Gulf War severely reduced capacity to 2,325 MW. By March 2003, capacity had increased to 4,500 MW.[13] Today, demand is nearly double the total generation capacity.

Table 2-1 compares current electricity generation and transmission capacities with the original CPA goals.

Electricity sector output is still falling short of goals. Generation capacity is more than 2,000 MW below the goal stated in 2003. Because all parts of the grid must work together, this shortfall in generation means that the benefits of increased transmission and distribution capacity cannot be realized. A USAID audit found that this shortfall is partly caused by external factors, such as security and budget shifts.[15]

Outcomes

Completed projects are meeting expected outputs in this sector, but the Iraqi populace is

ELECTRICITY SECTOR OUTCOMES

OUTCOME METRIC	PRE-WAR LEVEL	STATED GOAL BY CPA	END-STATE AFTER DEFERRAL[16]	CURRENT STATUS, AS OF 01/02/06[a]
Iraq Hours of Power/Day	4-8	NA	10-12	10.2
Baghdad Hours of Power/Day	16-24	NA	10-12	3.7

[a]Hours of power/day has reached higher levels during this reporting quarter. The data in the table is the most recent information available. It is difficult to assess the overall benefits provided nationwide in this sector. Iraqis living in Baghdad have only 10-12 hours of power per day—less than Baghdad received under Saddam Hussein's regime when electricity was diverted from other parts of the country to power the capitol. Those living outside Baghdad, however, will likely have more hours of power than before the war. SIGIR interviews indicate that there was a strategic shift by the Iraqis to provide power more equitably throughout the country, instead of focusing on Baghdad as Saddam Hussein did.
Sources:
Pre-war level and End-state: DoS Briefing by U.S. Embassy-Baghdad, November 30, 2005.
Current: DoS *Iraq Weekly Status* report, January 3, 2006.

TABLE 2-2

not yet seeing the benefits of additional power. One important reason is that demand continues to grow faster than capacity can be brought online.

The number of hours of electricity service that Iraqis receive each day is a key measure of the benefits of the improved Electricity sector. Table 2-2 presents these metrics in relation to the pre-war levels, as of the end of this reporting period. Figure 2-6 shows the electricity load served in 2005.

Challenges

Progress in reconstructing the sector faces significant challenges, including security, high demand, and deteriorated infrastructure.

SECURITY ABSORBS MORE FUNDING THAN EXPECTED

One of the most important challenges facing the U.S.-led effort to develop the Electricity sector is insurgent attacks. Well-organized attacks on the electricity infrastructure have caused power outages, sometimes on a national level. These attacks were linked to the Oil and Gas sector by targeting the delivery of Iraq's limited refined fuel stocks for use in electric generation.[17] Attacks on infrastructure and personnel have also slowed reconstruction progress by forcing funds to be diverted from project development to increased security. In March 2005, two USAID electricity generation task orders were cancelled to shift $15 million to security.[18]

This makes effective Iraqi assumption of security duties essential. It may take several years for the threat to diminish significantly.

RISING DEMAND

During summer 2005, generation capacity peaked at 5,375 MW but fell short of projected demand for that period. But even if all project goals were met, the Electricity sector still would not be able to meet the increasing demand. Iraq's demand for power remains high [currently 7,000+ MW according to the Iraq Reconstruction and Management Office (IRMO)], which the Ministry of Electricity attributes to the creation of new jobs, industries, and factories as the economy begins to recover from the former regime. Additionally, an influx of new appliances and new customers has increased the grid's exposure to consumer demand. The Government Accountability Office (GAO) also reported in July 2005 that electricity requirements are affected to some degree by illegal taps into the grid and by a lack of metering.[19]According to the U.S. Institute of Peace, electricity subsidies have contributed to this spike in demand and have played a large role in electricity shortages around the country.[20]

The consequences are still a major concern, particularly as demand increases in the winter and summer. The Department of State (DoS) *Iraq Weekly Status* report shows that the estimated demand for electricity outpaces what is generated: The load-served falls short of demand by almost 60,000 megawatt hours (MWh).[21] GRD-PCO reports that the key

to addressing excess electricity demand and consolidating the long-term viability of the Iraqi power supply is to reform the process of charging consumers for usage.

DETERIORATED INFRASTRUCTURE

Compounding the problems associated with operating in a highly insecure environment, the electricity infrastructure was kept in significant disrepair throughout the 1990s and leading up to the March 2003 conflict. This disrepair extended throughout all three components of the Electricity sector—generation, transmission, and distribution—and was characterized by decades of constant operation without regular maintenance. GAO reports that spare parts were largely unattainable throughout the 1990s because of international sanctions following the Persian Gulf War, thus requiring extensive overhaul of antiquated equipment that is now difficult to procure. The effects of this degraded infrastructure were worsened by post-war looting and sabotage.[22] Immediately after Operation Iraqi Freedom, Iraq's ability to generate electricity dropped to less than 2,000 MW and all of the nation's power stations were in poor condition from years of deferred maintenance.[23]